

→ File Permit Mod 50

# STATE OF COLORADO

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Dedicated to protecting and improving the health and environment of the people of Colorado

## HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION

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Colorado Department  
of Public Health  
and Environment

November 6, 1995

Mr. Steve Slaten  
U.S. Department of Energy  
Rocky Flats Office  
P.O. Box 928  
Golden CO 80402-0928

RE: Proposed Action Memorandum / Modification of the Corrective Action Section of the  
Operating Permit for Rocky Flats Environmental Technology Site - IHSS 109, OU2

Dear Mr. Slaten,

Attached is a copy of the Proposed Action Memorandum (PAM) and Permit Modification for the treatment and storage of soils excavated from IHSS 109, OU2. The comment period for this document ended on October 30, 1995 with no comments received from the public. Discussions with the Department of Energy (DOE) and its integrating contractor\* resulted in comments being submitted by DOE. These comments have been incorporated into this document and therefore, no response to those comments has been prepared. The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division is modifying the Corrective Action section of the Operating Permit for RFETS to reflect this decision document. Replacement pages for Section XV will be sent to DOE.

If you have any questions regarding these matters, please contact Carl Spreng with the Division at 692-3358.

Sincerely,

~~Joe Schlegel~~

Rocky Flats Unit Leader  
Hazardous Waste Control Program

cc: Bill Fitch, DOE  
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DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
CLASSIFICATION OFFICE

PROPOSED ACTION MEMORANDUM AND  
MODIFICATION OF THE  
CORRECTIVE ACTION SECTION OF THE OPERATING PERMIT  
FOR ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

10/30/95

## 1.0 INTRODUCTION

This Proposed Action Memorandum (PAM) and modification of the Corrective Action section of the operating permit outlines the approach that will be taken and the applicable requirements for the removal of organic contaminants from soil excavated from Individual Hazardous Substance Site (IHSS) 109, Operable Unit 2, Rocky Flats Environmental Technology Site (RFETS). IHSS 109 is also known as Ryan's pit and was used as a disposal site for various organic chemicals from approximately 1966-1970. A previously prepared PAM (Document Control Number RF/ER-95-0097.UN) under the Rocky Flats Interagency Agreement (IAG) focused on source removal at Ryan's pit, which consisted primarily of soil removal. This PAM addresses the proposed processing of contaminated soils using thermal desorption technology and was developed to complement the source-removal PAM. Except where specifically cross-referenced, other sections of the operating permit are not applicable to this action.

## 2.0 STORAGE

Contaminated soil from Ryan's pit has been placed into roll-off containers. If the soil is in storage for greater than 90 days, then the storage units discussed in this document will be considered Temporary Units under 6 CCR 1007-3, 264.553. As identified under this regulation, the Temporary Unit classification applies due to the relatively small volume of soil to be stored and the short period of storage, which will be less than six months from the approval date of this document. Following processing and evaluation of confirmation samples, the treated soil is expected to be returned to Ryan's pit.

The contaminated soil will be managed according to the requirements listed below. These requirements generally govern the condition and compatibility of containers with waste materials and the management and inspection of the containers.

- All containers holding contaminated soil shall be in good condition (6 CCR 1007-3, 264.171).
- All containers holding contaminated soil will be made of, or lined with, materials that will not react with the contained material (6 CCR 1007-3, 264.172).
- All containers holding contaminated soil will remain closed during storage except when it is necessary to add or remove contaminated soil. Canvas or plastic tarpaulins may be used as a cover device to close the roll-off containers. The roll-offs will be handled in such a way as to preclude leakage or rupture at any time (6 CCR 1007-3, 264.173).

- All containers holding contaminated soil shall be inspected weekly in the period after excavation and before processing. The focus of these inspections shall be to look for leaks and for deterioration caused by corrosion or other factors. A log book documenting these inspections and all deficiencies and corrective actions shall be kept (6 CCR 1007-3, 264.174).
- Roll-off containers used for the storage of contaminated soil will be manufactured such that the base of the container will be elevated. This elevation will protect the contaminated soils within the roll-off containers from contact with precipitation caused by runoff on the land surface (6 CCR 1007-3, 264.175(c)(2)) and also allows for visual inspection for leaks.

Additional requirements will be placed on liquid organic contaminants recovered from the thermal desorption units condenser. The requirement that shall be followed to ensure proper handling of the condensate while in storage is:

- A temporary secondary containment system will be established which protects against release of recovered liquid organic contaminants into the environment. The condensing unit on the thermal desorber will be considered a container. Secondary containment will be established around this container which allows for complete capture and retainment of the entire condenser contents if the condenser were to be breached. Secondary containment will also be established for 55-gallon drums or other similar containers which contain recovered organic waste removed from the thermal desorption unit's condenser. This secondary containment will be designed and operated to contain the contents of one 55-gallon drum and a minimum of 10 percent of the liquid waste volume stored within the secondary containment. This containment will be free of cracks or gaps and will be sufficiently impervious to contain leaks. The containers within the secondary containment system will be elevated by pallets or similar devices to prevent contact with accumulated liquids. Run-on into the secondary containment system will be prevented by the walls of the system. Any spilled or accumulated liquids (including precipitation) will be removed within 24 hours after detection (6 CCR 1007-3, 264.175). Spills of hazardous waste, including organic condensate, will invoke the Contingency Plan contained in Part VI of the RFETS Part B Permit.

The staging area for roll-offs containing contaminated soil and 55-gallon drums of organic waste will have signs posted and labels placed in conspicuous locations, indicating appropriate dangers.

### 3.0 TREATMENT

The treatment unit discussed in this document is considered a Miscellaneous Unit under 6 CCR 1007-3, Part 264, Subpart X. Other appropriate sections, including Part 264, Subparts AA and BB, and Part 265, Subpart P, have been used as guidelines to develop permit conditions and standards. Further information concerning the surface soil, geology, and hydrology is contained the RCRA Facility Investigation/Remedial Investigation Report for Operable Unit 2, particularly Chapters 2, 3, and 4. This section outlines the approach that will be taken and the applicable requirements for the removal of organic contaminants from soil excavated from Ryan's pit.

A low-temperature thermal desorption system will be used to remove volatile organic compounds (VOCs) in a non-destructive manner from soils excavated from Ryan's pit. The soils will be processed on a batch-by-batch basis by passing air through the contaminated soil to volatilize or "strip" the VOCs from the soil into the vapor phase. In addition to the air sweep, heat and vacuum will be applied to the soils to enhance the VOC-stripping process. The vapor-phase contaminants will then be recovered by condensation and activated carbon adsorption.

The thermal desorption unit will be sited adjacent to the roll-off container storage area near IHSS 110 east of the Industrial Area of RFETS. Because this area is located within the RFETS boundaries, access is restricted. Access will be further restricted by establishing an exclusion zone around the unit.

Additional description of the thermal desorption system components, operation, and secondary waste streams that will be generated is presented below. The operating data presented in subsection 3.1 are typical of batch-operated, low-temperature thermal desorption systems. Because a thermal desorption unit has not yet been contracted, these operating parameters may not precisely describe the specific unit used for this task. Once a unit has been contracted, and at least 7 days prior to operating the unit, more detailed and complete operating parameters will be provided to the Colorado Department of Public Health and Environment (CDPHE). Information to be included in this submittal will include items listed in Attachment 1.

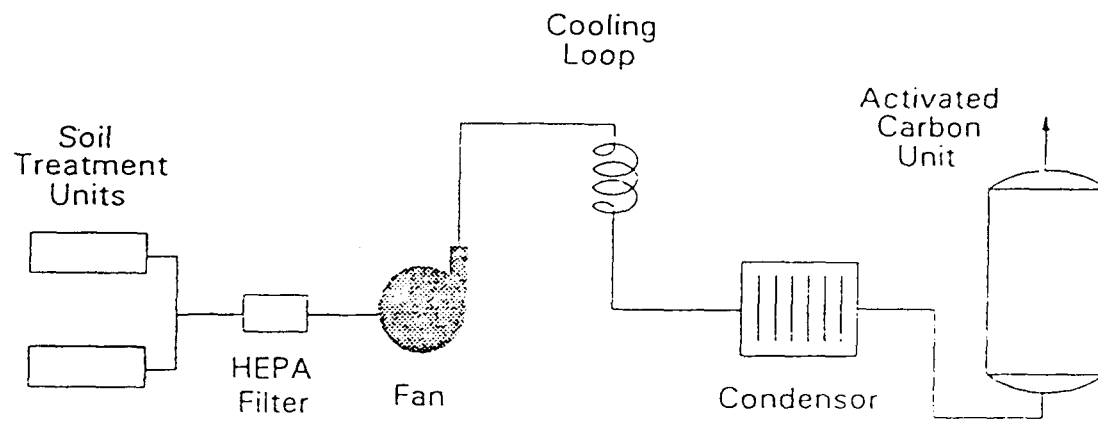
Soil removed from the thermal desorption unit will be temporarily placed into previously decontaminated roll-off containers, waiting for the results of confirmation sampling to verify the attainment of the performance standards listed in Section 5.2. This sampling will be performed in accordance with the Sampling and Analysis Plan referenced in Section 5.0.

### 3.1 System Description and Operation

Figure 1 presents a process flow sheet of the thermal desorption process. VOC-contaminated soil is loaded into the soil treatment units in batches. Each soil treatment unit may be loaded with up to six cubic yards of soil. However, due to the high moisture content levels that may be encountered in Ryan's pit, it is anticipated that each unit will be loaded with approximately four cubic yards of soil to more efficiently strip the soil. Feedstock soil will be transferred from covered storage containers (i.e., roll-offs) to the soil treatment units with a backhoe, Bobcat, or other type of heavy machinery. The soil treatment units are constructed of heavy structural steel and are capable of supporting the weight of a backhoe or other large machinery. The structural steel construction makes the units suitable for treating soils containing hazardous waste. Prior to unloading, a storage container (e.g., roll-off) will be located as close to the desorber as possible to minimize the distance the soil will have to be moved by the backhoe or Bobcat. If free liquids are encountered during excavation activities, additional site preparation will take place to prohibit any spill of free liquids contaminating clean areas.

Soil clumps loaded into the treatment units that are greater than eight inches in diameter will be broken into smaller pieces. Low-temperature batch desorption is capable of effectively removing VOCs from soil clumps up to eight inches in diameter.

Figure 1  
Thermal Desorption Process Flowsheet



Because of the relatively small volume of contaminated soil associated with the Ryan's pit remediation project (approximately 200 cubic yards), the two-unit system illustrated in Figure 1 is expected to be used. The thermal desorber may be equipped with up to four soil treatment units for maximum throughput. Processing capability of the two-unit system is approximately 4 tons per hour (2.5 cubic yards/hour). Once loaded, the soil treatment units are closed and an air sweep is induced across the soil beds by a fan unit. The air sweep creates a slight vacuum in the soil treatment units which serves to enhance the VOC stripping rate. Stripping is also enhanced by the indirect heating of the soil. Heat is generated by burning propane (or natural gas) and passing the hot combustion gases through metal tubes located above the soil in the treatment units. Heat from the combustion gases is transferred through the tube walls to the air sweep and soil. All three heat transfer mechanisms are present: conduction, convection, and radiation. The energy input rate of the thermal desorber is approximately 1.5 million BTU per hour. This heating rate is achieved by burning approximately 28 gallons of liquid propane fuel per hour. Soil operating temperatures range from 150 to 300 degrees Fahrenheit.

The VOC contaminants contained in the air sweep/offgas exiting the soil treatment units are treated prior to discharge. First, a high efficiency particulate air (HEPA) filter is used to remove any soil particulates that may be entrained in the offgas. The offgas is then cooled by a condenser to recover the majority of water and VOC contaminants as liquids. Because the condenser produces liquid wastes, secondary containment will be provided around the condenser unit. No chemicals are added as part of the desorption process; thus, no chemical incompatibilities are anticipated. The condenser is the first unit that concentrates the desorbed contaminants. As noted above, both the VOCs and water are condensed simultaneously. Following the condensing process, the offgas is polished with vapor-phase activated carbon to recover residual VOCs prior to discharge.

The thermal desorption unit will be operated in accordance with the thermal treatment standards found in 6 CCR 1007-3, Subpart P of Section 265. Additionally, the air emission standards for process vents and equipment leaks defined in 6 CCR 1007-3, Subparts AA and BB of Part 264 will apply.

### 3.2 Waste Acceptance Criteria for Thermal Desorption Unit

Criteria are established below to ensure the safety of workers and the protection of equipment during the processing of contaminated soil. Debris, such as wood, scrap metal and glass, may be encountered during source removal activities and will not be restricted from processing as long as the debris can be sized to fit into the desorption unit. Clumps of contaminated soils will be broken up if their diameter exceeds eight inches to ensure that all internal volumes are treated. In addition to the general requirements stated above, the following is a list of specific items that will be prohibited from treatment with this thermal desorption unit if encountered in material removed from Ryan's pit:

- Items that are explosive as defined by the Department of Transportation (49 CFR 173.5, Subpart C);

- Items that are corrosive (6 CCR 1007-3, 261.22);
- Items that are reactive (6 CCR 1007-3, 261.23); and
- Unexpected items encountered during field activities in which unresolved questions exist regarding personnel safety or the protection of equipment.

#### 4.0 CLOSURE

This section addresses requirements necessary to meet the closure performance standards contained in 6 CCR 1007-3 Part 264.111 for the closure of the roll-off containers and thermal desorption unit.

Following the completion of contaminated soil processing, organic condensate, granulated activated carbon, and used HEPA filters will be removed from the thermal desorption unit and be disposed of as described in Section 5.3 below. The thermal desorption unit, associated equipment, and roll-off containers will then be decontaminated according to procedure number 4-SO-ENV-OPS-FO.04, Decontamination of Equipment at Decontamination Facilities. Performance standards are part of this procedure. The decontamination procedure requires project personnel to complete an "Equipment Decontamination/Wash Checklist and Record" sheet. Project personnel must verify that equipment has been decontaminated to the levels specified in the procedure ROI 3.02, "Performance of Surface Contamination Surveys". This procedure incorporates the radiological release levels codified in 10 CFR 835, Radiation Protection for Occupational Workers. Performing radiological decontamination to the levels specified in 10 CFR 835 will ensure that all other forms of contamination are similarly removed.

Decontamination methods and solutions are described in the referenced procedure. Volumes of waste water generated during decontamination will depend on levels of contamination, the configuration of the vendor's thermal desorption unit, etc. However, all efforts will be made to limit the amount of decontamination water generated, while still meeting the release standards specified in ROI 3.02.

It is expected that this large scale decontamination will take place at the site's centralized decontamination facility located in the contractors' yard. Both the roll-off containers and thermal desorption unit are expected to be returned to the owners for subsequent use after decontamination.

#### 5.0 WASTE ANALYSIS PLAN

A task specific sampling and analysis plan has been prepared for this task (Document Control Number RF/ER-95-0107, Sampling and Analysis Plan for the Remediation of Ryan's Pit, Operable Unit 2). Elements of the plan include data quality objectives, number, types and locations of samples, and references to analytical and sampling procedures. This plan includes both pre- and post-process sampling activities and is the vehicle for collecting and analyzing volatile organic data to perform a hazardous waste determination following processing. This plan was reviewed and approved by the Colorado Department of Public Health and Environment and

the Environmental Protection Agency.

### 5.1 Waste Determination for Contaminated Soils

In May, 1995 four soil samples were collected from Ryan's pit and analyzed for volatile organic compounds. The following is a preliminary listing of the maximum concentrations detected. Only contaminants of concern for which concentrations exceed 1 ppm are included and the data are unvalidated.

Compound	Concentration (mg/kg)
1,1-dichloroethane	4.7
1,1,1-trichloroethane	430
trichloroethene (TCE)	20
4-methyl-2-pentanone	5.3 J*
tetrachloroethene (PCE)	470
toluene	310
ethylbenzene	92
xylene (total)	590

\* J qualifier for organic detections indicates estimated result

These concentrations may be indicative of average concentrations of volatile organics within the soils excavated from Ryan's pit. However, higher concentrations have been discovered by subsequent trench characterization sampling. Additional sampling for volatile organic compounds will be conducted after the contaminated soil is removed from the ground prior to processing in the thermal desorption unit in order to determine operating parameters for the unit.

The excavated soil is considered an environmental medium which contains organic contaminants. These contaminants include Comprehensive Environmental Response Compensation and Liability Act (CERCLA) hazardous substances (40 CFR, Section 302.4) and Resource Conservation and Recovery Act (RCRA) listed hazardous wastes, and may include levels of hazardous constituents that are characteristic of hazardous wastes. These discarded organic solvents were derived from non-specific processes at Rocky Flats Plant. Tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane are considered F001 or F002 listed wastes. The other compounds are considered characteristic wastes if analyses show they are present in quantities sufficient to exhibit characteristics of hazardous waste.

Because they contain listed hazardous wastes, these soils must be managed as if they were hazardous waste, including land disposal restrictions. As long as contaminant levels in the soils present excess carcinogenic risks to human health greater than  $1 \times 10^{-6}$  or will exceed a hazard quotient of 1.0 for non-carcinogenic effects, then those soils must continue to be managed as if they were hazardous waste unless and until decontaminated.



## 5.2 Performance Standards

The performance standards listed below are being established for removal of VOCs from soils originating in Ryan's pit. These standards correspond to a noncancer hazard quotient of 1 or to an excess carcinogenic risk to human health of  $1 \times 10^{-6}$  for residential exposure. If analytical results of treated soils are reported as non-detections at sample quantitation limits (SQLs) exceeding the performance standards, then the performance standards are considered achieved.

Soils meeting these performance standards may be returned to Ryan's pit assuming that the soils do not exhibit any characteristics of a hazardous waste. Land disposal restrictions will no longer apply. Debris processed through the thermal desorption unit will be evaluated using after-process soil samples to the same performance standards established for Ryan's pit soils. Processed debris may then be disposed of in the present landfill or recycled.

According to stipulations agreed to as part of the regulatory-agency approval of this remedial action (Kaiser Hill letter 95-RF-06601), DOE and its integrating contractor "recognize that further action may be necessary in the future at IHSS 109 to meet final remediation goals following the source removal. The further action would be dependent on whether final cleanup levels were achieved during the source removal."

Compound	Performance Standard <sup>1</sup> (mg/kg)	Boil °C
1,1-dichloroethane	980	57
1,1,1-trichloroethane	980	71
trichloroethene (TCE)	3	87
4-methyl-2-pentanone	--	116
tetrachloroethene (PCE)	11	121
toluene	520	111
ethylbenzene	260	136
xylene (total)	320	144

<sup>1</sup> Soil Screening Guidance, EPA OSWER Directive 9355.4-14FS, 12/94 (Draft)

## 5.3 Secondary Waste Streams

The thermal desorption process described will generate several secondary waste streams. These waste streams include condenser liquids, spent HEPA filter media, and spent activated carbon. The condenser liquids will consist of free-phase organic liquids and water (i.e., two phases). Depending on the volume of recovered water, the water may be separated from the free-phase organic liquid and sent to the Sitewide Water Treatment Facility, located in Building 891, or the Operable Unit 2 field treatment unit, or a combination of the two for subsequent treatment. The other waste streams may be contaminated with low levels of organic contaminants. These waste streams, including the free-phase organic liquids, will be drummed and a waste determination will

be made. Once characterized, these wastes will be shipped offsite for proper disposal as a hazardous waste, as appropriate. These waste streams are expected to be free of radiological contamination. This determination will be made after generation and before waste is sent offsite.

Soil particulates recovered by the cyclone will be recombined with the treated soils. Waste water generated during decontamination activities will be managed according to procedures described in Section 4.0.

## 6.0 WASTE MINIMIZATION

Contaminated soil processed through a thermal desorption unit results in a significant reduction in waste handling and offsite disposal because of the nature of the technology. The chemical composition and mass of the contaminants are not changed during the process. Following processing, the soil should no longer contain hazardous levels of volatile organics and can be returned to its place of origin. The contaminants are captured in the thermal desorber's condenser and in the activated carbon units.

## 7.0 AIR EMISSIONS

The Air Pollution Control Division of the CDPHE has determined that an Air Pollution Emissions Notice (APEN) will not be required for this activity. Compliance with applicable requirements of 6 CCR 1007-3 Part 264, Subparts AA (Air Emission Standards for Process Vents) and BB (Air Emission Standards for Equipment Leaks) will be ensured by appropriate monitoring and inspecting. Emissions-related monitoring and inspection requirements found in Part 265.377(a) will also be complied with.

## 8.0 TRAINING

All excavation, monitoring and processing will be performed under a task-specific health and safety plan (HSP) in accordance with Occupation Safety and Health standards in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. Training will include respirator fit tests, hazardous waste operations, and radiological training as required by the specific job function. All task-specific training requirements will listed in the HSP and will be followed.

## 9.0 CONTINGENCY PLAN

Generally, Part IV of the Rocky Flats Part B Permit will be followed for contingency planning purposes. However, because of the limited nature of this task, preparation of separate contingency planning documents such as an evacuation plan will be covered by the task-specific health and safety plan. The task-specific health and safety plan will be reviewed by all personnel working within the exclusion zone boundaries at the task site.

The contingency plan describes various criteria for classification of releases of hazardous waste. Some volatilization of organic contaminants is expected during the removal, storage and subsequent transfer of soils to the thermal desorption unit. This volatilization will be monitored

for the duration of the project and will be considered a permitted release. However, any spills of liquid hazardous waste from primary containment as defined in the contingency plan contained in Part IV of the RFETS Part B Permit will invoke the entire contingency plan.

#### 10.0 IMPLEMENTATION SCHEDULE

The processing of the Ryan's pit soils is scheduled to commence during the last quarter of 1995. Processing must be completed within six months of the approval date of this PAM/Permit Modification.

## Attachment 1

The more detailed and complete operating and monitoring parameters should include:

- How and where "soil operating temperatures" will be measured must be delineated. Operating temperature range could be expressed as a soil exit temperature, or air temperature within the unit, or both.
- In addition to maximum clump size, other soil feedstock parameters (e.g., moisture content, plasticity, humus content) must be defined.
- Vacuum pressure (either absolute or relative to ambient pressure) and flow rate should be provided in order to evaluate mass flux.
- A description of the basis for varying residence time should be mentioned.
- Temperature and emission control devices must be monitored at least every 15 minutes. "Appropriate corrections to maintain appropriate thermal treatment conditions must be made immediately either automatically or by the operator. Instruments which relate to temperature and emission control would normally include those measuring waste feed, auxiliary fuel feed, treatment process temperature, and relevant process flow and level controls." (6 CCR 1007-3, Part 265.377(1)).
- Methods for monitoring stackgas emissions must be defined. "The stack plume, where present, must be observed visually at least hourly for normal appearance (color and opacity)." (6 CCR 1007-3, Part 265.377(2)).
- Appropriate organics must be monitored in order to confirm proper operating conditions and compliance with 6 CCR 1007-3, Part 265, Subpart AA.
- "The complete thermal treatment process and associated equipment must inspected at least daily for leaks, spills, and fugitive emissions, and all emergency shutdown controls and system alarms must be checked to assure proper operations." (6 CCR 1007-3, Part 265.377(3)).
- Procedures to prevent breakthrough at the activated carbon unit should be described.
- Procedures to comply with the monitoring and recording requirements of 6 CCR 1007-3, Part 264, Subparts AA and BB must be included.
- Any monitoring equipment described should also be shown in a revised process flowsheet (Figure 1).
- Provide additional waste analyses giving the heating value of the material to be treated and verifying that lead and mercury have not been detected above background levels (6 CCR 1007-3, Part 265, Subpart P).